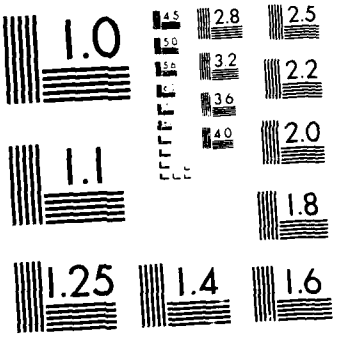
AD-A156 674 METAL CONTACTS ON SEMICONDUCTORS(U) UNIVERSITY COLL 1/1
CARDIFF (WALES) R H WILLIAMS 30 APR 85
DAJA45-84-C-0028

UNCLASSIFIED F/G 7/2 NL


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
6.3
7.1
8.0
9.0
10.0

(2)





# METAL CONTACTS ON SEMICONDUCTORS

Principal Investigator: Professor R H Williams

Contractor: University College Cardiff

Contract Number: DAJA 45-84-C-0028

2nd Periodic Report: 1 January 1985 - 30 April 1985



The research report in this document has been made possible through the support and sponsorship of the U.S. Government through its U.S. Army Research and Standardization Group (Europe). ~~This report is intended only for the internal management use of the contractor and the U.S. Government.~~

File name: AM18045-1c

FIRST BI-ANNUAL REPORT FOR US ARMY

Alastair McLean

18.4.85

An investigation into the factors influencing the electrical properties of GaAs Schottky contacts has been started. Initially it was attempted to make electrically ideal contacts to chemically etched GaAs surfaces by evaporating Au overlayers at room temperature. Although it is possible to occasionally make good diodes in this fashion it is not possible to make contacts consistently with near ideal characteristics (n is usually $\geq$ 1.5). However, the best contact made in this way did have an ideality factor of n = 1.02 and a barrier height of $\phi_B^{IV}$ = 0.88 eV. The GaAs used in this sequence of experiments was undoped, (100), n-type with a carrier concentration of $2.3 \times 10^{16} cm^{-3}$.

It has been suggested that better I-V characteristics can be obtained by heating the GaAs surface to 120°C before and during evaporation to drive off any adsorbed water vapour. Heating the surface to approximately 40°C was found to improve the ideality factor. However heating the surface to 120°C was found to greatly increase the value of the contact series resistance.

Other metals used include Pt and Ga both of which give barriers to GaAs.

The effect of introducing an insulating layer of polycrystalline $BaF_2$ between the GaAs and the metal overlayer has been investigated. In general,

both the barrier height and the n value of the contact increase introducing a layer of $BaF_2$ with a thickness of 20 Å increased both the barrier height and the ideality factor. It has been shown that a mixture of $CaF_2$ and $SrF_2$ can be grown epitaxially on GaAs. It should be possible to investigate the properties of GaAs contacts with epitaxially grown insulating fluoride layers

At present epitaxially Al contacts to both n and p type GaAs are being prepared by GEC at the Hirst Research Centre. The I-V characteristics of epitaxially grown metal contacts to GaAs exhibit near ideal electrical behaviour. A comparison will be made between an epitaxial and a polycrystalline metal overlayer on both n and p type GaAs.

END
DATED
FILM
8-88
DTIC